CPSC 3720: Lecture 5: Requirements Engineering

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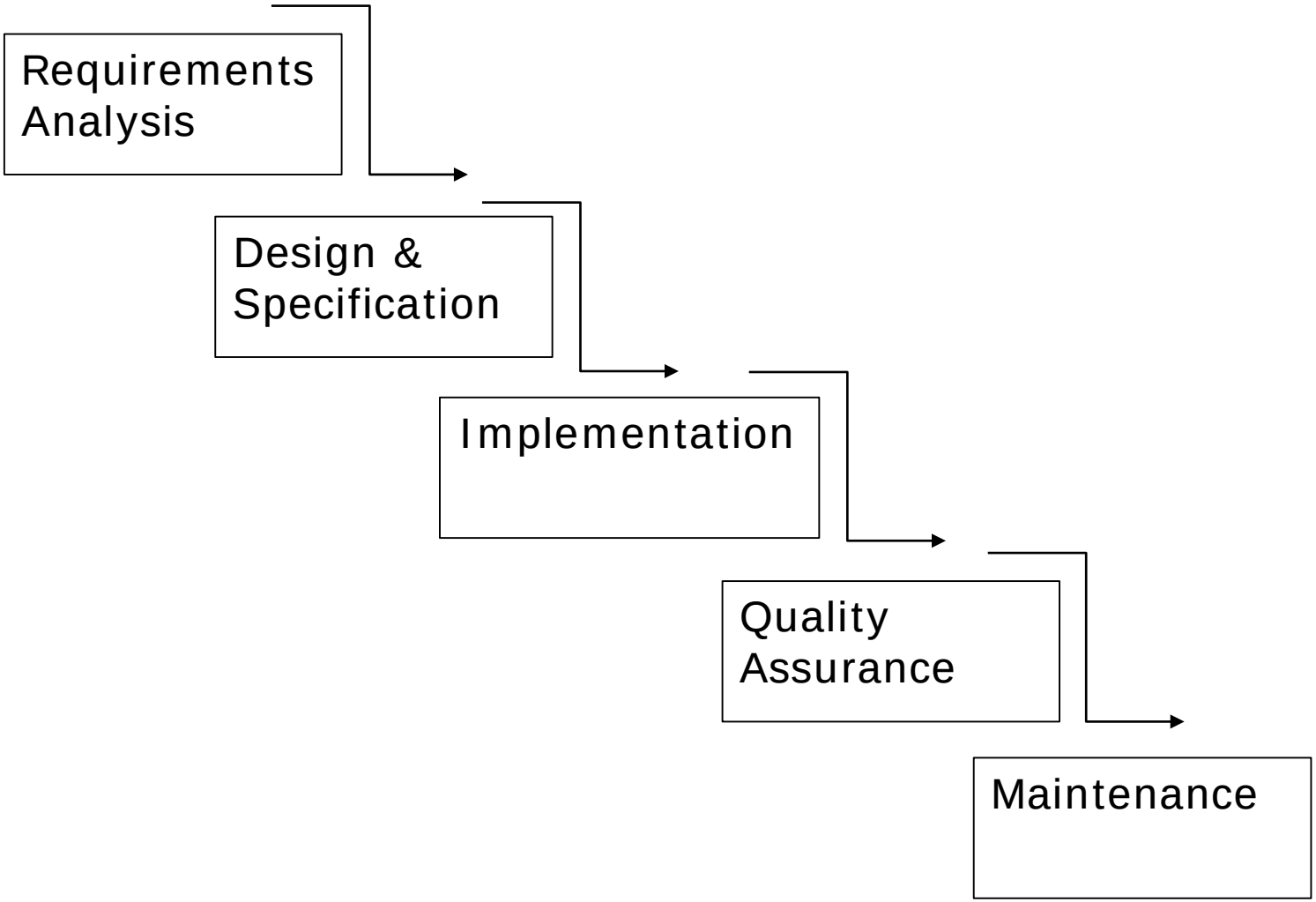
Linear: Classical Waterfall Model



Process Quality: CMM

- CMM = Capability Maturity Model
  - Watts Humphrey @ CMU's SEI
    - Managing the Software Process (1989)
- Levels:
  - Initial
  - Repeatable
  - Defined
  - Managed
  - Optimizing

CMM Characterization of Ratings

- Initial
  - Ad hoc
- Repeatable
  - A repeatable process is in place
- Defined
  - Above + Standards are in place
- Managed
  - Above + Metrics collection is in place
- Optimizing
  - Above + Continuous improvement methods are in place

REQUIREMENTS ENGINEERING

Requirements Engineering

- Requirements elicitation
- Requirements modeling
- Requirements analysis
- Requirements documentation
- Requirements validation
- Requirements management

Requirements Elicitation

- Identifying stakeholders
- Understanding goals, business case, priorities, and risks
- Interviews

Requirements Elicitation

- Making a business case
- Understanding priorities
  - Must have features
  - Bonus features
- Resolving conflicts
  - When different stakeholders communicate different priorities how do you decide which are true priorities?
- Understanding risks
  - What do we mean by “risk”?
  - May have to determine risks based on responses to interview questions; may not have direct answers

Types of Interview Questions

- Questions concerned with the system to be developed
- Questions concerning the context/scope of the system
- Meta-questions

Types of Interview Questions

- Questions concerned with the functionality of the system to be developed
  - Goal is to understand both functional and non-functional requirements, such as performance
  - Examples
- Questions concerning the context/scope of the system
  - Physical system, the environment where the system will be used, deadlines, etc.
- Meta-questions
  - Questions about questions
  - Are we asking the right questions? Are we talking with the right people

Exercise

- Gather into groups of 3 (your project team)
- One of you will act as the client
  - Think of an application that you would like to sponsor the development of
  - Should be possible for other 2 to implement in 5 weeks @ 20 hrs/week each
- Other two elicit requirements
  - Function
  - Non-functional

Model / Requirements document

- Present your model of the application to the client
  - Was it what the client expected?

Model / requirements document

- Present your model of the application to the class

Compare approaches

- Commonalities among approaches to documentation / modeling?
- Differences?

Requirements Modeling

- Key Idea: Understand what aspects of the system are relevant to model and what are irrelevant

- Develop a model that is sufficiently complex, but not more than necessary to capture the essential elements

Discussion: Requirements Modeling

Requirements Analysis

- Initial analysis
- Budget estimates and milestones
- More interviews
- Consistency and Sufficient (or Relative) Completeness

Analysis Methods

- Structured Analysis
  - Function-oriented analysis
  - Later in this lecture
- Use case analysis
  - Usage-oriented analysis
  - Next lecture
- Others…

Requirements Documentation

- Structured Analysis
  - Context Diagram
  - Dataflow diagrams (or bubble diagrams)
  - Process descriptions (process = functions here)
  - Data dictionary
  - Entity-Relationship diagram (ER diagrams)
  - …
- Use case analysis
  - Use case modeling diagrams
  - Use cases
  - …

Requirements Validation

- Interviews
- Rapid prototyping

Requirements Management

- Requirements are not apparent in one sitting with stakeholders
- The requirements elicitation, analysis, validation process is iterative
- Requirements will change
- Change needs to be documented and managed

Structured Analysis Example

- Structured Analysis
  - Context Diagram
  - Dataflow diagrams (or bubble diagrams)
  - Process descriptions (process = functions here)
  - Data dictionary
  - Entity-Relationship diagram (ER diagrams)
  - ...

Team Project Assignment

- Project 1: Requirements Analysis
- Part 1: Due next week
- Requirements for all parts and projects: Electronic PDF submissions only; Need to document the contribution of each team member.
- Parts are required submissions to provide you feedback! If a project part showing sufficient effort is not submitted, you will be assigned a 0 for the whole project.